



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,972	06/26/2003	Chien-Hua Chen	200208828-1	7437

22879 7590 09/15/2005

HEWLETT PACKARD COMPANY
P O BOX 272400, 3404 E. HARMONY ROAD
INTELLECTUAL PROPERTY ADMINISTRATION
FORT COLLINS, CO 80527-2400

EXAMINER

KOVAL, MELISSA J

ART UNIT PAPER NUMBER

2851

DATE MAILED: 09/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/608,972

Applicant(s)

CHEN ET AL.

Examiner

Melissa J. Koval

Art Unit

2851

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9, 11-29 and 36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 11, 12, 14-29 and 36 is/are rejected.
- 7) ☒ Claim(s) 13 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 6-9, 11, 12 and 36 are rejected under 35 U.S.C. 102(e) as being anticipated by Rumer (U.S. Patent 6,486,462 B1).

Claim 1 sets forth: "A display device, comprising (See the "Field of the Invention):
a static spectral separator configured to refractively separate multispectral light
Into a plurality of light bands (See prismatic element 46.); and
a homogenizing element configured to homogenize at least one separated
light band (See collimators 41 and 45, for example. Also see combiner 47.)." See
column 5, lines 13 through 37.

Claim 2 sets forth: "The display device of claim 1, further comprising a light
source configured to produce the multispectral light." See column 4, lines 65 through
67, or column 5, lines 1 through 4 with respect to source fiber 40.

Claim 6 sets forth: "The display device of claim 1, where the static spectral
separator includes a prism." Again refer to prismatic element 46.

Claim 7 sets forth: "The display device of claim 4, where the cross-section

Art Unit: 2851

The display device of claim 1, where the static spectral separator is configured to separate the multispectral light into at least three light bands." See Figure 4, for example.

Claim 8 sets forth: "The display device of claim 7, where the at least three light bands include red, green, and blue light bands." Refer to column 4, lines 23 through 45 wherein all colors of light are referred to.

Claim 9 sets forth: "The display device of claim 1, comprising at least one homogenizing element for each separated light band." See column 5, lines 13 through 25.

Claim 11 sets forth: "The display device of claim 9, where each homogenizing element includes a light pipe." With respect to claim 11, again see the collimators.

Claim 12 sets forth: "The display device of claim 1, further comprising an interlacing structure configured to interlace the separated light bands." See column 5, lines 49 through 67, and column 6, lines 1 through 17.

Claim 36 sets forth: "A display device, comprising (See the "Field of the Invention):

a spectral separator configured to refractively separate multispectral light into a plurality of light bands (See prismatic element 46.); and

at least one homogenizing element configured to homogenize each separated light band (See either collimator 41 or 45, for example. Also see combiner 47.)."

Claims 1-8, 12, and 14 through 18 are rejected under 35 U.S.C. 102(e) as being anticipated by Park et al. (U.S. Patent 6,714,353 B2).

See Figure 2 of '353, for example.

Claim 1 sets forth: "A display device, comprising (optical device 54 provides both homogenizing and color separation.):

a static spectral separator configured to refractively separate multispectral light into a plurality of light bands (See dichroic coating surfaces 56 and 58, and see column 5, lines 12 through 17. Furthermore see column 5, lines 47 through 58, for an example from the pertinent embodiment discussing refraction.); and

a homogenizing element configured to homogenize at least one separated light band (rod lens 51)."

Claim 2 sets forth: "The display device of claim 1, further comprising a light source configured to produce the multispectral light." See column 4, lines 66 and 67, as well as column 5, lines 1 through 3.

Claim 3 sets forth: "The display device of claim 1, further comprising an image-forming element configured to form an image using the homogenized light band." See display device 78.

Claim 4 sets forth: "The display device of claim 3, where the homogenized light band is configured to have a cross-section that facilitates scanning onto the image-forming element." See column 6, lines 23 through 39.

Claim 5 sets forth: "The display device of claim 4, where the cross-section includes an elongate ribbon." See Figures 3 and 4, for example, wherein color stripe regions R,G,B are shown.

Claim 6 sets forth: "The display device of claim 1, where the static

Art Unit: 2851

spectral separator includes a prism." See triangular prisms 62 and column 5, lines 25 through 46.

Claim 7 sets forth: "The display device of claim 1, where the static spectral separator is configured to separate the multispectral light into at least three light bands." Again refer to Figures 3 and 4, for example, wherein color stripe regions R, G, B are shown. Also refer to rotating prism 72 and column 6, lines 56 through 67, and column 7, lines 1 through 5.

Claim 8 sets forth: "The display device of claim 7, where the at least three light bands include red, green, and blue light bands." Claim 8 is rejected for the same reasons already applied to claims 5 and 7.

Claim 12 sets forth: "The display device of claim 1, further comprising an interlacing structure configured to interlace the separated light bands." Scrolling is discussed in column 6, lines 56 through 67, and column 7, lines 1 through 5 with respect to Figures 3 and 4.

Claim 14 sets forth: "The display device of claim 1, where the image-forming element includes a micromirror array." See column 1, lines 23 through 27.

Claim 15 is rejected for the same reasons already applied to rejected claims 1 through 3.

Claim 16 is rejected for the same reasons already applied to rejected claims 1 through 3 and 14.

Claim 17 is rejected for the same reasons already applied to rejected claim 12.

Claim 18 sets forth: "The method of claim 17, further comprising providing a

Art Unit: 2851

scanning device configured to scan the interlaced homogenized light bands across the image-forming element." Again refer to rotating prism 72.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5, 7-9, 11,12,14,15,17-22, and 24-29 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Slobodin (U.S. Patent 6,334,685 B1) in view of Hwang (U.S. Patent 6,588,906 B2).

Claim 1 sets forth: "A display device, comprising:

a static spectral separator configured to refractively separate multispectral light into a plurality of light bands; and

a homogenizing element configured to homogenize at least one separated light band."

Slobodin '685 B1 teaches all of the elements set forth in claim 1 except that Slobodin does not teach a static spectral separator in a single light valve projection display. Instead, Slobodin makes use of a color wheel 22 for separating white light into multispectral light. In particular, see the embodiments of Figures 11A, 11B, 12A and 12B. In column 6, lines 30 through 67, and column 7, lines 1 through 22, the presence

Art Unit: 2851

of optically transparent material is discussed. In column 7, lines 12 through 14 the following is set forth:

The conical color wheel embodiments of FIGS. 11 and 12 have greater light attenuation because light is transmitted twice through the dichroic filter segments.

Clearly, one having ordinary skill in the art would understand that refraction, and the color separation of light, at least in part by refraction, occurs with respect to the embodiments shown in Figures 11 and 12.

An additional teaching of the presence of refraction in the device is given in the SUMMARY OF THE INVENTION, column 2, lines 33 through 46.

Hwang '906 B2 teaches a static spectral separator (color light beam splitter unit 70) comprised of three switchable color filters 71, 72 and 73 in a single light valve projection display. Also in the BACKGROUND OF THE INVENTION, Hwang teaches various structures known in the art for separating white light into multispectral light including three dichroic mirrors or a color wheel. Column 2, lines 26 through 34, compare resolution of the image formed on the spatial light modulation for a system using a color wheel with a system using three mirrors. It is an object of the invention of Hwang to improve over the color wheel or three dichroic mirrors by using the static spectral separator described as color light beam splitter unit 70 by increasing image resolution and quality. See the SUMMARY OF THE INVENTION of Hwang.

Furthermore, in column 2, lines 10 through 46, of Slobodin '685 B1, Slobodin discusses how a color separation device in cooperation with a homogenization device can result in a superior image on the face of a single light valve. The inventions of Slobodin '685 B1 and Hwang '906 B2 are analogous.

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the color light beam splitter unit 70 of Hwang '906 for the color wheel 22 of Slobodin '685 B1, thus meeting the limitations of claim 1. The motivation for one having ordinary skill in the art to make such a substitution would be to better control the light onto the face of the single spatial light to increase the quality of the projected image.

Claim 2 sets forth: "The display device of claim 1, further comprising a light source configured to produce the multispectral light." See light source 12, lamp 14, reflector 16, and polychromatic light 18 of '685 B1.

Claim 3 sets forth: "The display device of claim 1, further comprising an image-forming element configured to form an image using the homogenized light band." See light valve 48 and column, lines 17 through 37 of '685 B1.

Claim 4 sets forth: "The display device of claim 3, where the homogenized light band is configured to have a cross-section that facilitates scanning onto the image-forming element." Refer to Figure 4 of Slobodin '685 B1 and also column 4, lines 50 through 56. Also see column 2, lines 10 through 25, and column 3, lines 43 through 58.

Claim 5 sets forth: "The display device of claim 4, where the cross-section includes an elongate ribbon." Again refer to Figure 4 as well as Figures 5 and 6 of Slobodin '685 B1. The segments of the light pipe 30, which includes first, second, and third optically conductive cores 70, 72, and 74, meet the claimed limitation of a cross-section including an "elongate ribbon". Refer to column 4, lines 50 through 67.

Furthermore, note that first through third input apertures 32, 34 and 36 of optically

Art Unit: 2851

conductive cores 70, 72, and 74 receive first through third light beams 24, 26 and 28 in red, green and blue sequence.

Claim 7 sets forth: "The display device of claim 1, where the static spectral separator is configured to separate the multispectral light into at least three light bands." Again refer to column 3, lines 34 through 48 of '685 B1.

Claim 8 sets forth: "The display device of claim 7, where the at least three light bands include red, green, and blue light bands." Claim 8 is rejected for the same reasons already applied to claim 7.

Claim 9 sets forth: "The display device of claim 1, comprising at least one homogenizing element for each separated light band." Refer to column 2, lines 33 through 42 of '685 B1.

Claim 11 sets forth: "The display device of claim 9, where each homogenizing element includes a light pipe." Claim 11 is rejected for the same reasons already applied to claim 9.

Claim 12 sets forth: "The display device of claim 1, further comprising an interlacing structure configured to interlace the separated light bands." See column 2, lines 10 through 25 of Slobodin '685 B1. On page 9 of applicant's specification, applicant teaches a repeated light pattern with respect to interlacing.

Claim 14 sets forth: "The display device of claim 1, where the image-forming element includes a micromirror array." See column 4, lines 24 and 25.

Claims 15 and 19 are rejected for the same reasons already applied to rejected claims 1 through 3.

Art Unit: 2851

Claim 17 is rejected for the same reasons already applied to rejected claim 12.

Claim 18 is rejected for the same reasons already applied to rejected claim 4.

Claim 19 is rejected for the same reasons applied to already rejected claims 15, 17 and 18.

Claim 20 sets forth: "The method of claim 19, where generating multispectral light includes generating substantially white light." In Slobodin '685 B1, see column 3, lines 30 through 32, wherein lamp 14 is described as a metal halide arc lamp. Applicant mentions metal halide lamps at the top of page 4 of his specification.

With respect to claim 21, see optional prism 46 of '685 B1.

With respect to claims 22 and 25, see the rejection of claim 16 above.

Claim 24 sets forth: "The method of claim 19, where forming an image includes selectively reflecting the light band from a reflective image-forming element." Refer to column 4, lines 24 and 25 wherein light valve 48 is described as a reflective CMOS device.

With respect to claim 26, refer to the rejection of claim 4 above.

With respect to claim 27, refer to the rejection of claim 5 above.

With respect to claim 28, refer to the rejection of claim 7 above.

With respect to claim 29, refer to the rejection of claim 9 above.

With respect to claim 36, refer to the rejection of claim 1 above.

Response to Arguments

Applicant's arguments filed July 11, 2005 have been fully considered but they are not persuasive. The inherency of refraction in transparent devices is first suggested by Park in column 5, lines 47 through 58. One of ordinary skill in the art would also understand that dichroic coating surfaces 56 and 58 both reflect and refract light to separate multispectral light into a plurality of light bands. (See the citation below from "Projection Displays", pages 92 through 98, for a textbook explanation.). Applicant states on page 8 of his remarks filed July 11, 2005, the following:

"As the Park et al. reference fails to disclose a device or method that refractively separates light into a plurality of light bands, applicants suggest that the reference fails to disclose each and every element of the rejected independent claims 1 and 15, and that the reference fails to anticipate the rejected claims. As claims 2-8, 12, 14 and 16-18 depend directly or indirectly from claims 1 and 15, applicants suggest these claims a similarly not anticipated by Park et al."

For the reasons already stated by the Examiner above, the Examiner asserts that Applicants arguments are incorrect and therefore submits that the rejection of claims 1-8, 12, and 14-18 under 35 U.S.C. 102(e) as being anticipated by Park et al. U.S. Patent 6,714,353 B2 above is correctly maintained.

With respect to page 8 of Applicant's remarks as directed to the rejection of claims 1-5, 7-9, 11, 12, 14, 15, 17-22, and 24-29 under 35 U.S.C. 103(a) as being unpatentable over Slobodin (U.S. Patent 6,334,685) in view of Hwang (U.S. Patent 6,588,906), the Examiner maintains that the rejection is correct for the reasons given in

Art Unit: 2851

the body of the rejection as set forth above and for the following reasons. As for Applicant's remarks suggesting that "the examiner has failed to establish the *prima facie* obviousness of the rejected claims," the Examiner emphasizes that Applicant review column 2, lines 7 through 45 of Hwang. It is well known that three dichroic mirrors may be substituted for a color wheel or the reverse depending on variables including desired resolution and aspect ratio of the device.

With respect to Applicant's remarks directed to the failure of Slobodin to teach the separation of multispectral light into bands of colored light by refraction, and particularly the following remarks set forth on page 9, the Examiner suggests that there is nothing merely incidental or inconsequential about Snell's Law:

"In the Office action dated January 21, 2005, the Examiner suggested that Slobodin, in fact discloses a refractive spectral separator because the color wheel of Slobodin includes an optically transparent material, and refraction is inherent in transparent materials. Applicants suggest that the claims do not recite mere incidental and inconsequential refraction at some point in a light path, but they recite refractively separating light into a plurality of light bands.

For a textbook recitation of Snell's Law see the citation below from "Projection Displays" pages 90 through 92, for example.

Finally, the Examiner asserts that a *prima facie* case of obviousness has been established for the reasons given in both the body of the rejection and the remarks as set forth above, and the cited references do teach or suggest each and every element of the rejected claims.

Applicant's new claim 36 does not distinguish over the prior art of record for the reasons given above.

Allowable Subject Matter

Claim 13 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art of record neither shows nor suggests all of the elements comprised by claim 13 in combination, and in particular the use of dichroic mirrors to provide interlacing structure is not taught.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Tang U.S. Patent 6,893,133 B1 teaches a single panel color image projection system.

"Projection Displays", Stupp and Brennessoltz, John Wiley & Sons, Ltd.
Copyright 1999, pages 89 through 98.

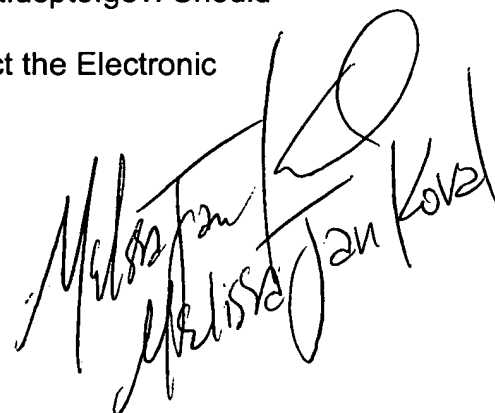
Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melissa J. Koval whose telephone number is (571) 272-2121. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Judy Nguyen can be reached on (571) 272-2258. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "Melissa J. Koval", is located in the bottom right corner of the page. The signature is stylized and overlaps with the end of the text block.